

DOES S3 OR S4 STIMULATION CONFER FAVOURABLE RESULTS IN SACRAL NERVE STIMULATION FOR FUNCTIONAL BLADDER PROBLEMS?

Hypothesis / aims of study

Sacral nerve stimulation is a widely recognised therapy for treatment of both refractory overactive bladder symptoms and non-obstructive voiding problems (1). The body of evidence supporting its use in patients with bladder pain syndrome and neurogenic bladder problems is also increasing. Electrodes with four independent stimulators are placed in either the S3 or S4 foramen depending on best observed response to stimulation within the operating theatre. This study aimed to ascertain whether one foraminal level of sacral nerve stimulation was more likely to result in a positive improvement in symptoms and the likelihood of side effects associated with each level.

Study design, materials and methods

All patients who received a sacral nerve stimulator implant (temporary or permanent) between August 2009 and September 2013 in a large teaching hospital were identified from the theatre records. Data were gathered from an electronic patient records system which holds urodynamic assessments, clinic letters (including the records of the specialist nurse responsible for programming the device) and the operation note. All data were collected by a single author and entered on to an anonymised spreadsheet. The results were then coded and entered in to SPSS for analysis.

Patients receiving bilateral and unilateral implants were included, provided the bilateral implants were at the same level on each side. Both temporary and permanent implants were included unless the permanent device was conversion of a timed lead, in which case the temporary and permanent were considered as one case. Implants were fitted for detrusor over activity, detrusor sphincter dyssynergia, non-obstructive voiding dysfunction, detrusor failure, and neurogenic bladder. A greater than 50% improvement in symptoms as demonstrated by a post operative voiding diary was considered a successful response to sacral nerve stimulation.

Results

164 cases were logged as SNS implants on the operating theatre database. 27 cases were excluded from analysis for the following reasons: 16 patients had bilateral implants with the wire at different levels on each side; 6 cases were performed prior to the introduction of the electronic operation notes; in 3 cases no operation note could be found; 1 operation note did not contain adequate information; 1 procedure failed due to spinal anatomy and the implant was not actually implanted. This left 137 patients for analysis.

The group consist of 98 (72%) female patients and 39 (28%) male patients. The median age was 46 years (range 20-86 years). Implants were placed for DO in 77 (50%) patients and other diagnoses in 76 (50%) patients. 120 (88%) patients had unilateral or bilateral S3 implants, 17 (12%) had S4 level implants. Of the group receiving S3 level implants 75% (83) had a successful result; of the S4 patients 69% (11) had a successful result. The difference between these 2 groups was not significant ($p=0.404$ Fisher's exact test). This result remained insignificant when looking at just implants placed for detrusor overactivity where $p=0.616$ and when looking at implants placed for other diagnoses $p=0.257$.

Of 137 total patients, 16 (12%) patients experienced complications as follows: 6 capsulitis, 3 device malfunction, 3 lead displacement, 2 leg pain, 1 infection, and 1 worsening of symptoms. 15 (12%) of these patients had S3 level implants and 1 (6%) had an S4 implant. This result was not significant statistically ($p = 0.38$ Fisher's exact test) but whether it is clinically, remains to be seen.

Interpretation of results

Current practice is to place stimulation electrodes at the level of best physical response elicited during operation. These results suggest that this is a safe and appropriate strategy to follow, as no statistically or clinically relevant beneficial effect was seen by placing the implant at either S3 or S4 level. Furthermore, the rate of adverse events in each group was similar and thus does not indicate that a particular foraminal level should be used to avoid undesirable complications.

Concluding message

Both S3 and S4 electrode placement is appropriate in sacral nerve stimulation for functional bladder conditions. The foraminal level of placement should be dictated by the best physical response to stimulation identified at the time of implantation.

References

1. Efficacy and adverse events of sacral nerve stimulation for overactive bladder: A systematic review. Siddiqui NY, Wu JM, Amundsen CL. *Neurourol Urodyn.* 2010;29 Suppl 1:S18-23

Disclosures

Funding: none **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** it was a retrospective review of case notes with no impact on patients or treatment policies. **Helsinki:** Yes **Informed Consent:** No